



Interannual variations in biomass burning over the Amazon

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Biomass burning emissions over the Amazon vary due to climate variability (e.g. El Nino) and changes in the policy that aim to abate deforestation. In an earlier study, we showed that carbon uptake by vegetation was reduced in 2010 compared to 2011, but that the magnitude of the decrease strongly depended on the estimated 2010 and 2011 biomass burning emissions¹. Specifically, we derived that the El Nino induced 2010 Amazon drought resulted in a total reduction of carbon uptake of 0.24 to 0.50 PgC/yr and turned the balance from carbon sink to source.

In this study, we extend the period to more recent years (2010-2016). Starting from fire emission estimates from the Global Fire Assimilation System (GFAS) and the Global Fire Emissions Database version 4 (GFED4), we employ satellite-observed CO columns from the Infrared Atmospheric Sounding Interferometer (IASI) to optimise fire emissions in our TM5-4DVAR system. This system was recently successfully applied to the 2015 Indonesian fires².

As a next step, we will propagate the derived CO emissions over the Amazon to the prior CO₂ fire emissions of the Carbon-Tracker South America system. Using this improved prior, Carbon-Tracker assimilates CO₂ surface observations and aircraft profiles to derive the net carbon exchange between the Amazonian biosphere and the atmosphere. This net exchange and its variability will inform on the sensitivity of the Amazon to climate variability. A comparison to independent data (biosphere models, Solar Induced Fluorescence (SIF) from satellites) will also be presented.

References:

1. van der Laan-Luijkx, I. T. et al. Response of the Amazon carbon balance to the 2010 drought derived with CarbonTracker South America. *Global Biogeochemical Cycles* 29, 1092–1108 (2015).
2. Nechita-Banda, N. et al. Monitoring emissions from the 2015 Indonesian fires using CO satellite data. *Philosophical Transactions of the Royal Society of London B: Biological Sciences* 373, 20170307 (2018).